

DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. FERNALD

(Continued from page 261)

1. *DRABA ALPINA* L. *Densely caespitose*, the caudex forming several crowded crowns *with masses of dead marcescent foliage* below the living rosette: *leaves* flat, elliptic-lanceolate, oblanceolate or narrowly oblong, obtuse to subacute, *entire or nearly so*, 0.7–2 cm. long, 2–5 mm. wide, *glabrous or more or less pubescent with simple or forking trichomes* on one or both surfaces, *conspicuously villous-ciliate with simple trichomes about 1 mm. long*, rarely with forking hairs intermixed: flowering stem a *naked scape*, rarely with a leafy bract subtending the lowest flower, 3–15 (rarely –20) cm. high, *hispid with simple and forking trichomes*; *raceme* at first corymbiform, *in fruit corymbose-racemose*, 4–20-flowered: *rachis and slender pedicels* (up to 1 cm. long) *copiously villous-hirsute*; *sepals* oblong to oblong-ovate, rounded at summit, 1.5–3 mm. long, *more or less villous*: *petals* yellow, obovate, shallowly emarginate, 3.5–5.5 mm. long, 2.5–4 mm. broad: *anthers* 0.5–0.7 mm. long: *ovary* glabrous or sparsely hispid; *style* 0.5–0.7 mm. long; *siliques* narrowly to broadly ovate, elliptic or oblong, 4–9 mm. long, 2–4 mm. broad, glabrous or sparsely hispid, with 12–20 *seeds* 1.3–1.5 mm. long.—Sp. Pl. ii. 642 (1753); O. E. Schulz in Engler, Pflanzenr. iv¹⁰⁵. 84, fig. 8 (1927); Elis. Ekm. Svensk Bot. Tidskr. xxv. 479 (1931).—Arctic and subarctic regions, south on calcareous areas to Hudson Strait and the northern shores of Hudson Bay; northern Eurasia. LABRADOR: Ekortarsuk, Cape Chidley, C. Schmitt, no. 289; crevices of rock, Cape Chidley, August 6, 1884, R. Bell. UNGAVA: Port Burwell, Hudson Strait, J. M. Macoun, no. 79,069, Malte, no. 119,988. PLATE 290, FIGS. 1–4; MAP 1.

Var. *NANA* Hook.

Leaves with numerous long and simple or variously forking *trichomes on the surfaces*, 0.3–1 cm. long: *scapes* 0.5–7 cm. high.—Trans. Linn. Soc. xiv. 363 (1825). *D. Bellii* Holm in Fedde, Repert. iii. 338 (1907); Macoun, Geol. Surv. Can. t. 1 (date unknown); Payson, Am. Journ. Bot. iv. 261 (1917); Elis. Ekm. Svensk Bot. Tidskr. xxv. 469 (1931). *D. alpina*, var. *Bellii* (Holm) O. E. Schulz in Engler, Pflanzenr. iv¹⁰⁵. 89 (1927).—



Map 1. Range in eastern America of *ARNICA ALPINA*.

Arctic regions, south to Hudson Strait. UNGAVA: Port Burwell, Hudson Strait, *J. M. Macoun*, no. 79,072 (mixed with *D. fladnizensis*, var. *heterotricha*); crevices of rocks, Mansfield Island, August 30, 1884, *R. Bell*. PLATE 290, FIGS. 5-7.

I am not convinced by the treatments of either the late Dr. Payson or of Mrs. Ekman that *Draba Bellii* is a species distinct from *D. alpina*. It seems to me an extreme arctic development, with the regular reduction in size and the increase of trichomes which one would expect under most xerophytic conditions. The beautiful series of plants collected by Dr. W. Elmer Ekblaw on the Crocker Land Expedition of 1913-16 in northwestern Greenland contains quantities of material bearing out this interpretation. It is also significant that on the sheet of the isotype of *D. Bellii* in the Gray Herbarium the late Professor Ostenfeld, who certainly understood *Draba* in the Arctic better than most botanists, wrote "only *D. alpina*."

Numerous names have been proposed for the dwarf arctic extreme and Schulz recognizes in arctic and subarctic America the following, besides typical *D. alpina*: var. *nana* Hook., which he makes include var. *glacialis* Th. M. Fries (1869), not other authors; var. *Adamsii* (Ledeb.) O. E. Schulz, based upon *D. Adamsii* Ledeb. (1842), which Mrs. Ekman, l. c. 466, has identified, by comparison with the types, with the wholly different *D. micropetala* Hook. (1825); var. *Pohlei* O. E. Schulz, cited from Cape Chidley, and differing only in its narrow siliques (2-2.5 mm. wide); var. *Bellii* (above discussed); var. *corymbosa* (R. Br.) Durand (1856), based on *D. corymbosa* R. Br. (1819), which, as Mrs. Ekman has shown (l. c. 493), was based on the identical type of *Cochlearia fenestrata* R. Br. to which genus and species *D. corymbosa* actually belongs; and var. *pilosa* (Adams) Regel, based on *D. pilosa* Adams, the type of which, according to Mrs. Ekman (l. c. 484) is a wholly different plant from any form of *D. alpina*, with "linear, carinate leaves, which are keeled on the underside and ciliate in long, hispid, simple hairs. The upper part of the stalk is glabrous like the pedicels" etc.

For our dwarf extreme of *Draba alpina* the name var. *nana* Hook. seems safe, at least.

2. *D. FLADNIZENSIS* Wulfen, var. *HETEROTRICHA* (Lindblom) Ball. Loosely to densely *cespitose*, the many branches and branchlets of the *caudex* closely *invested* below the living rosettes *with* pale, marcescent *subulate midribs* of former leaves: *leaves* oblanceolate, thin, 0.5-

1.5 cm. long, 1.5–4 mm. wide, entire or sparingly toothed, *with firm and finally prominent midrib, ciliate with simple or bifurcate trichomes, the surfaces glabrous except for simple, forking and stellate pubescence toward the tips of the expanding leaves: flowering stems very slender, filiform, scapose, very rarely with a small leaf, glabrous or sparsely hirtellous, 1–10 cm. high: raceme at first corymbiform, becoming short-racemose, with mature rachis 0.5–4 cm. long, 2–13-flowered: flowering pedicels up to 6 mm. long: sepals oblong, rounded at summit, 2–2.5 mm. long, 1.2–1.8 mm. broad, sparsely hirsute or glabrous: petals white, obovate, emarginate, 3.5–5 mm. long, 2–3.5 mm. broad: anthers 0.5 mm. long: ovary glabrous, with a very short style; siliques oblong to narrowly ovate, 5–10 mm. long, 2–3.5 mm. broad, glabrous, only obscurely or scarcely reticulate; septum without median fold or with slight basal fold: seeds 16–20, often apiculate, 1–1.5 mm. long.*—

Bull. Soc. Bot. Fr. vii. 230 (1860). *D. lactea* Adams, Mém. Soc. Nat. Mosc. v. 104 (1817); DC. Syst. ii. 347 (1821) and Prodr. i. 170 (1824); O. E. Schulz in Engler, Pflanzenr. iv¹⁰⁵. 261, fig. 25, H–L (1927). *D. androsacea* Wahlenb. Fl. Lapp. 174, t. 11, fig. 5 (1812) and various Am. auth., not Willd. (1800). *D. Wahlenbergii* Hartm. Handb. Skand. Fl. 249 (1820) and many later authors. *D. lapponica* DC. Syst. ii. 344 (1821) and many later authors. *D. Wahlenbergii*, β . *heterotricha* Lindbl. Linnaea, xiii. 324 (1839). *D. fladnizensis* Wats. in Gray, Syn. Fl. N. A. i¹. 109 (1895) and other Am. auth. in part, not Wul-



Map 2. Southeastern Extension in America of *DRABA FLADNIZENSIS*, var. *HETEROTRICHIA*.

fen (1778). *D. fladnizensis* **lactea* (Adams) and **lapponica* (Willd.) Dahl in Blytt, Haandb. Norges Fl. ed. Dahl, 382 (1906).—Arctic regions, south to the Torngat region of Labrador, Hudson Bay and the Canadian Rocky Mts.; northern Eurasia. LABRADOR: on slaty talus slope, Rowsell Harbor, lat. 58° 58', *Abbe & Odell*, no. 373; moist, mossy, northern face of Ridge (ca. 320 m.) extending south from East Bay, Ikordlearsuk, lat. 59° 55', *Abbe & Odell*, no. 382; steep, wet, cold bank of "K" River, Kangalaksiorvik, lat. 59° 18', *Abbe*, no. 375; spur on southwest side (1140 m.), Mount Tetragona, lat. 59° 18', *Abbe*, no. 379; lower slopes, north side of Komaktorvik, lat. 59° 16', *Abbe*, no. 376; top of ridge north of harbor, Razorback Harbor, lat. 59° 14', *Abbe*, no. 384; scree slide from top of Precipice Ridge to Komaktorvik Lake, lat. 59° 12', *Abbe*, nos. 380, 381; on granitic rock, North Shore of Duck Bight, north of Ryan's Bay, *Woodworth*, no. 239; Okkak, *Moravian Bros.*; Ramah, *A. Stecker*, no. 212x; East Summit of Bishop's Mitre, lat. 57° 56', *Abbe*, no. 386; West Summit of Bishop's Mitre, *Abbe*, no. 387. UNGAVA: Port

Burwell, Hudson Strait, *J. M. Macoun*, no. 79,072 (mixed with *D. alpina*, var. *nana*), *Malte*, nos. 120,038, 120,062, 120,136, 120,136a. PLATE 291; MAP 2.

Although some recent European authors keep *Draba lactea* Adams (*D. Wahlenbergii* Hartm.) apart as a species from *D. fladnizensis*, it is significant that the characters relied upon are not of the first importance. Lange, Ostenfeld and numerous others have united them and in Hultén's Flora of Kamtchatka, where *Draba* was worked up by Mrs. Ekman, she says of *D. lactea*:

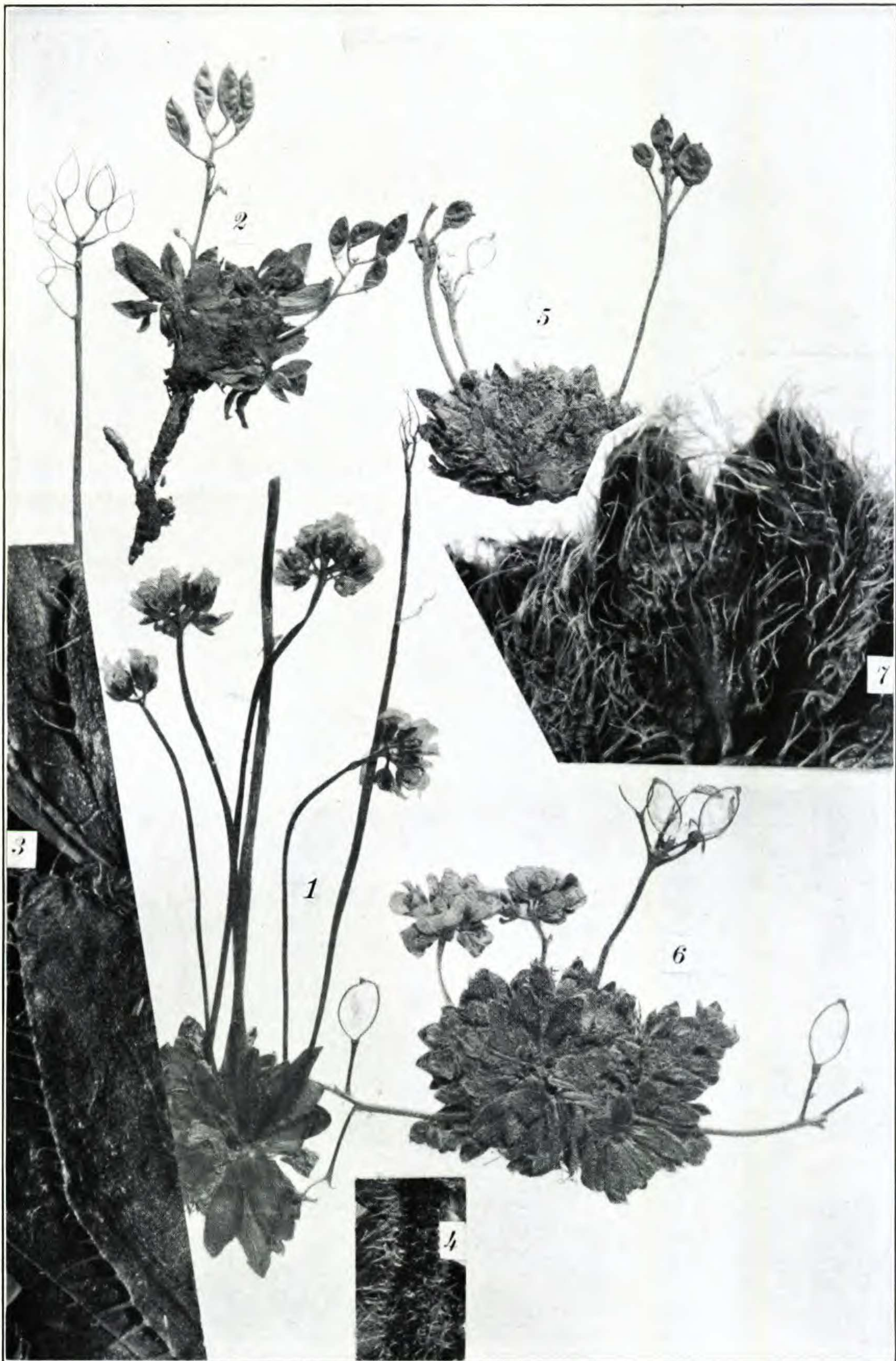
These specimens from Kamtchatka have some simple hairs even on the surface of the leaves and seem like most Siberian material somewhat infected with *D. fladnizensis* WULF.

D. lactea ADAMS has been identified by SCHULZ with *D. Wahlenbergii* HARTM. and *D. lapponica* DC. This identification is probably right, as the specimens in Herb. DE CANDOLLE given to DC. by STEVENS and FISCHER belong to these species,

From the diagnosis of ADAMS (loc. cit.) [of *D. lactea*] one must also conclude that *D. fladnizensis* is meant. ADAMS thus describes the leaves as "superne fere glabra subtus et ad marginem pilis simplicibus hispida" and mentions nothing about the stellate hairs that are characteristic of *D. Wahlenbergii*. This contradiction between the diagnosis and the second-type plants can only be explained under the assumption that, when making the diagnosis, ADAMS has had in view such impure, somewhat intermediate specimens as these here mentioned from Kamtchatka.¹

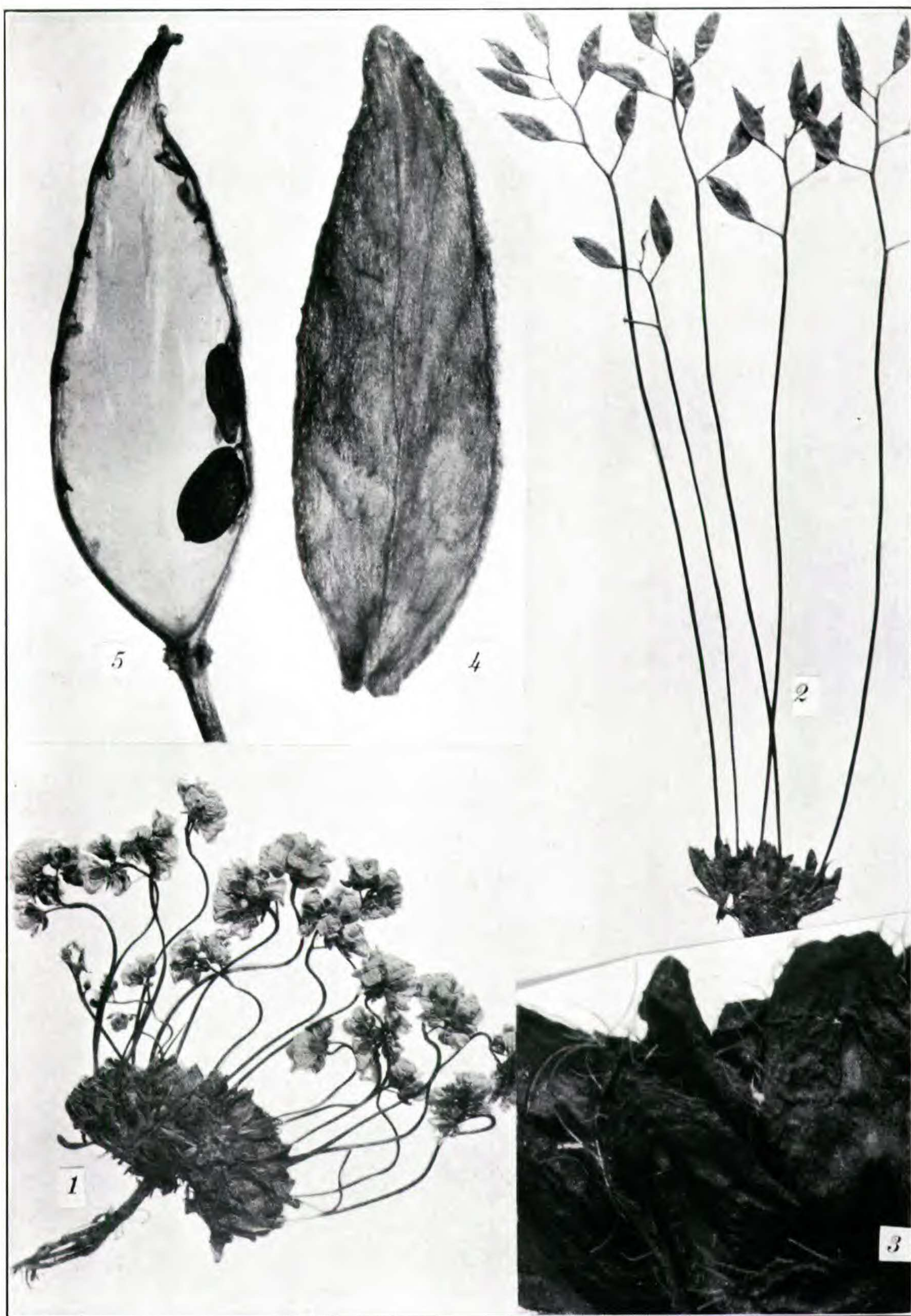
Since, as would appear from the above and numerous other published items, much of the Siberian (as well as Arctic) material is transitional from *D. fladnizensis* to *D. lactea* and since all the Kamtchatkan material is called *D. lactea* "somewhat infected by *D. fladnizensis*," although the latter is not known from Kamtchatka, I find myself beyond my depth in attempting to separate them as species. Further doubt of the specific distinctions of *D. fladnizensis* and *D. lactea* is encountered in Schulz's treatment of the Gaspé plant. The only relative of *D. fladnizensis* in southeastern Quebec is a common, densely matted species (PLATE 292) of the Shickshock Mountains, with strictly glabrous leaves, very narrow sepals and petals, lance-acuminate siliques mostly 4 or 5 mm. long and only 1-2 mm. wide, septum with a conspicuous and broad median flange, seeds only 10-16 in number: in other words a plant quite different from either *D. fladnizensis* or *D. lactea*. Nevertheless, upon one collection of this completely isolated and endemic Shickshock species Schulz extends *D. lactea* to Gaspé: "Lower Canada: Table-Topped Mts., Gaspé Co. (J. A. Allen 1881)." Upon another collection of the same plant he

¹ Elis. Ekm. in Hultén, Fl. Kamtch. ii. 163 (1928).

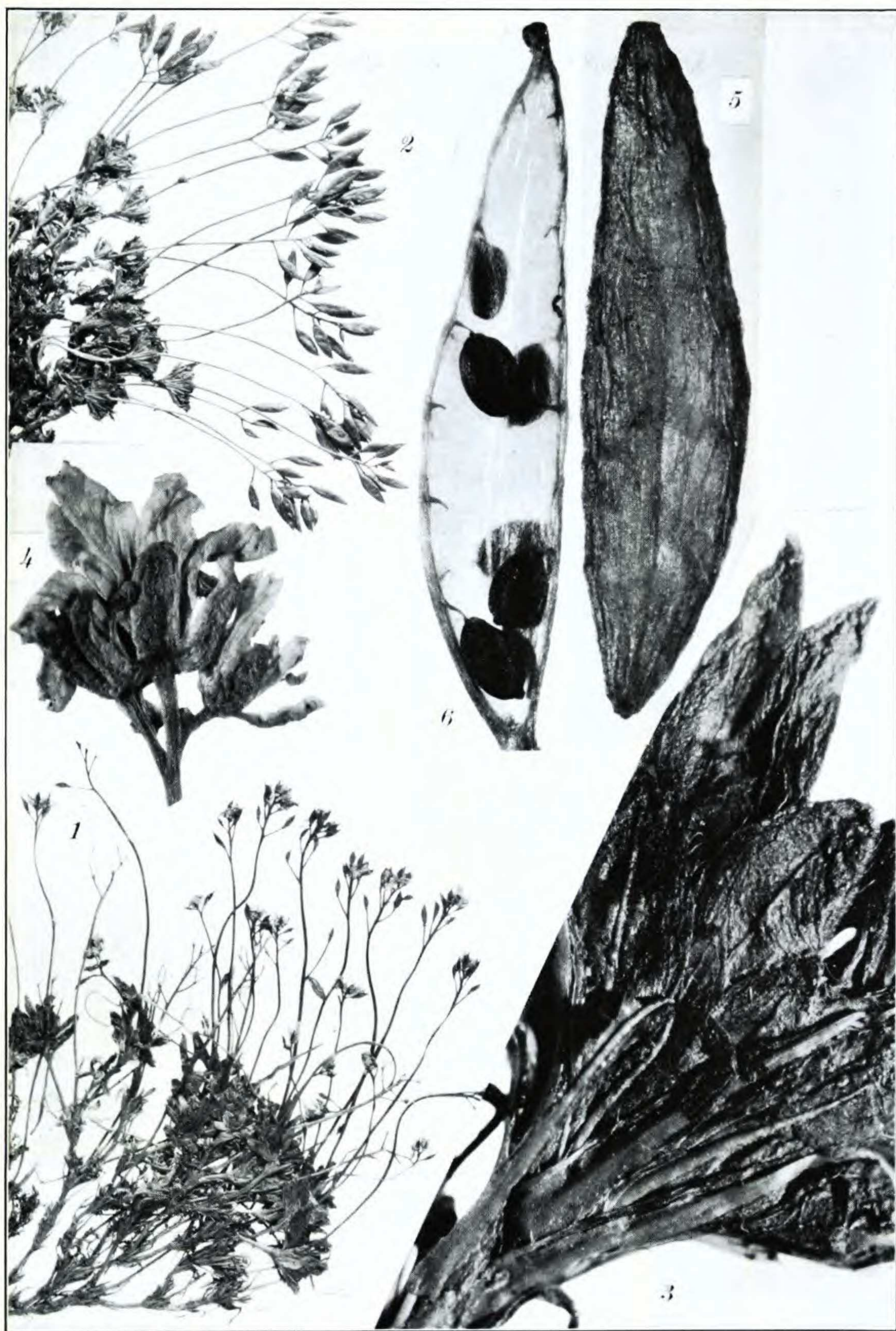


DRABA ALPINA: FIG. 1, flowering plant, $\times 1$, from Norway; FIG. 2, small fruiting plant, $\times 1$, from Torne Lappmark; FIG. 3, portion of rosette, $\times 10$, from fig. 2; FIG. 4, summit of scape, $\times 10$, from fig. 2.

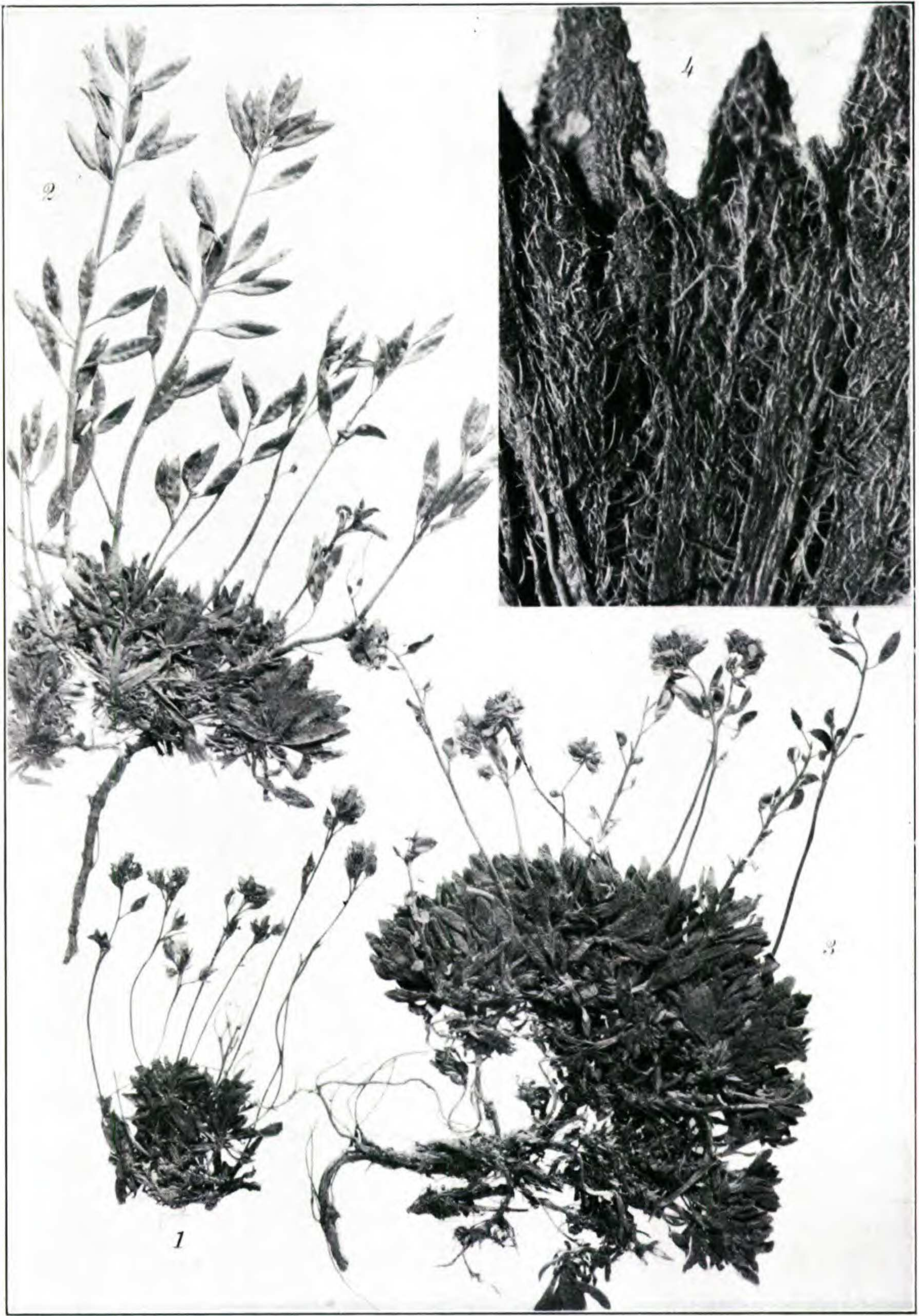
D. ALPINA, var. *NANA*: FIG. 5, fruiting plant, $\times 1$, from Mansfield Island, Hudson Bay (isotype of *D. Bellii*); FIG. 6, flowering plant, $\times 1$, from Thule, northwest Greenland; FIG. 7, leaves, $\times 10$, from fig. 6.



DRABA FLADNIZENSIS, var. *HETEROTRICHA*: FIG. 1, small flowering plant, $\times 1$, from Thule, northwest Greenland; FIG. 2, fruiting plant, $\times 1$, from Labrador; FIG. 3, tips of leaves, $\times 10$, from fig. 1; FIGS. 4 and 5, valve and septum, $\times 10$, from Torne Lappmark.



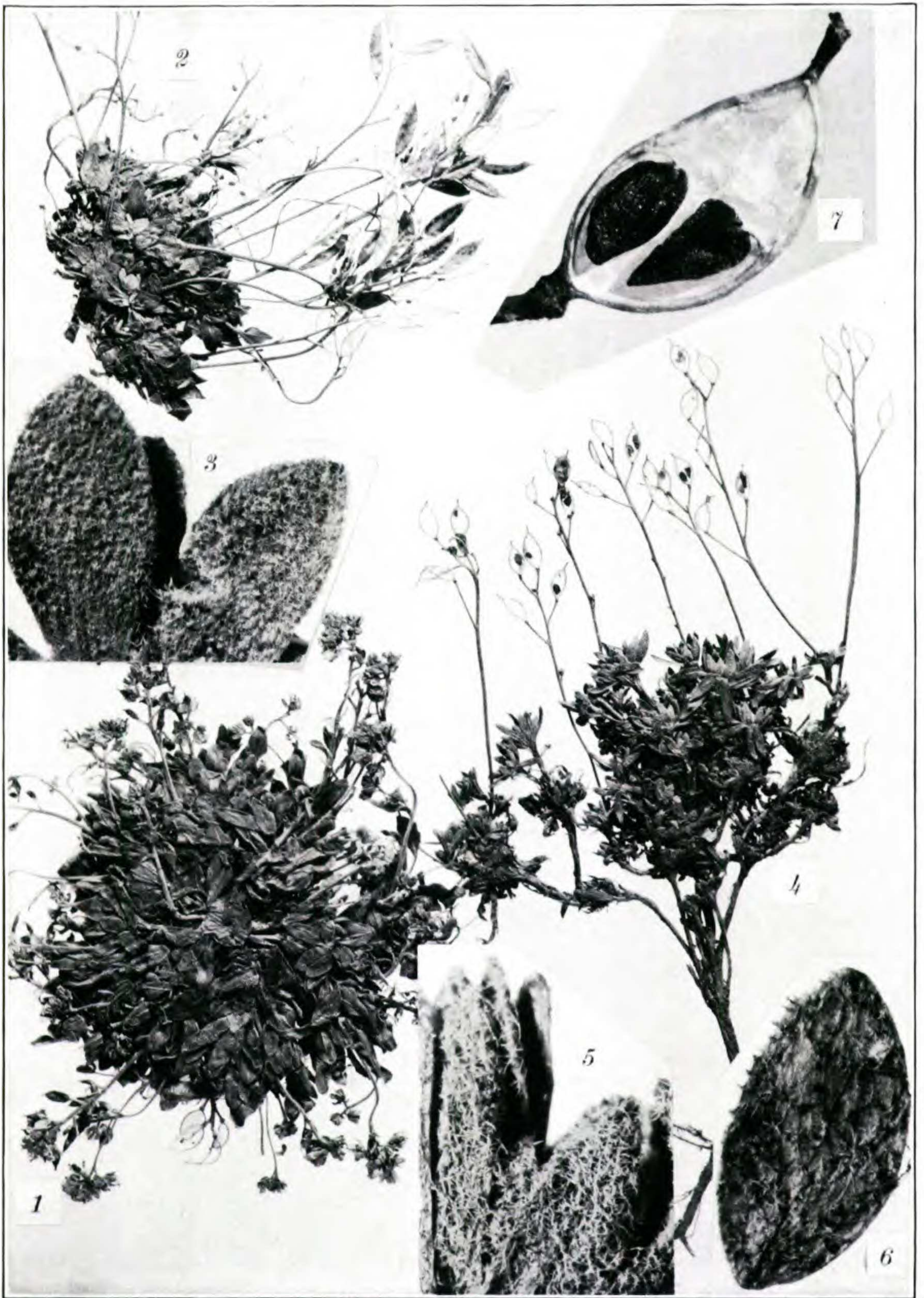
DRABA ALLENI, n. sp.: FIG. 1, portion of flowering plant, $\times 1$; FIG. 2, portion of fruiting plant, $\times 1$; FIG. 3, leaves, $\times 10$; FIG. 4, flowers, $\times 10$; FIGS. 5 and 6, valve and septum, $\times 10$; all from Shickshock Mts., Quebec.



DRABA RUPESTRIS: FIG. 1, small flowering plant, $\times 1$, from type locality, Ben Lawers, Scotland; FIG. 2, fruiting plant, $\times 1$, from Newfoundland; FIG. 3, flowering plant, $\times 1$, from Labrador; FIG. 4, leaves, $\times 10$, from fig. 2.

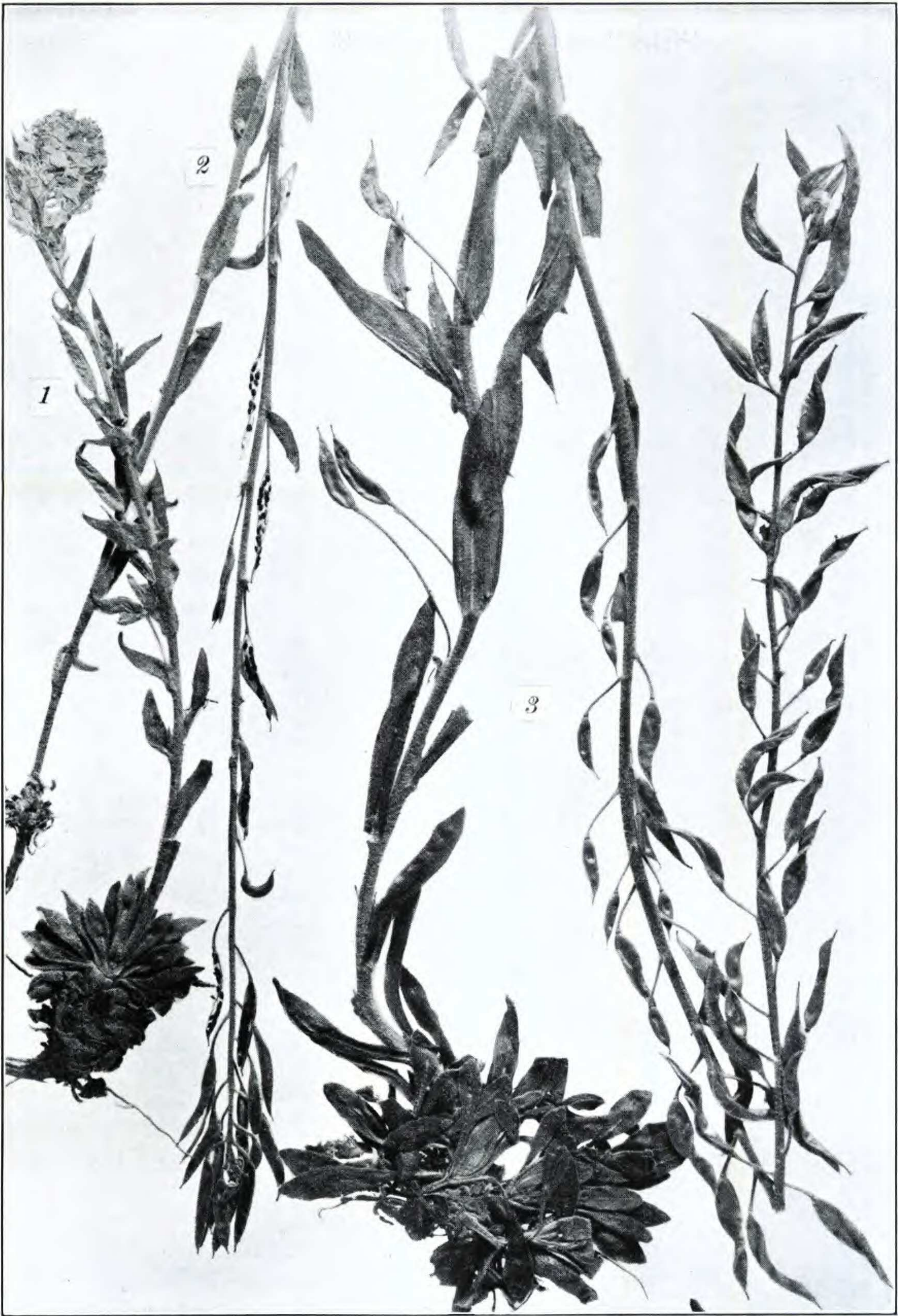


DRABA CRASSIFOLIA: FIG. 1, small flowering plants, $\times 1$, from original collection of Drummond; FIG. 2, flowering and fruiting plants from Labrador; FIGS. 3 and 4, fruiting and flowering plants from Greenland, $\times 1$; FIG. 5, leaf and base of scape, $\times 10$, from fig. 2; FIG. 6, flower, $\times 10$, from fig. 4.

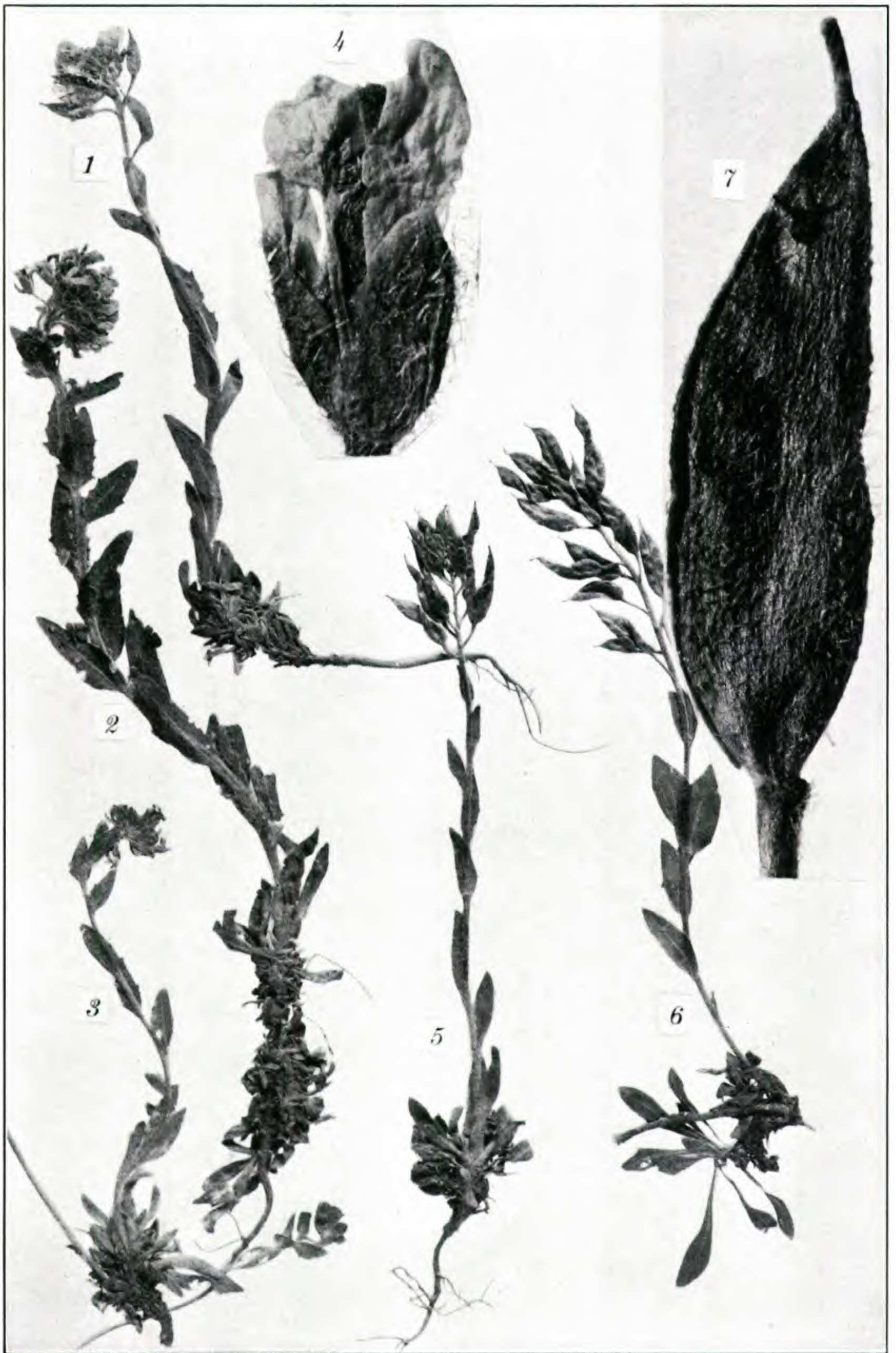


DRABA NIVALIS: FIG. 1, flowering plant, $\times 1$, from Greenland; FIG. 2, fruiting plant, $\times 1$, from Greenland; FIG. 3, leaves, $\times 10$, from Newfoundland.

D. PEASEI, n. sp.: FIG. 4, fruiting plant (TYPE), $\times 1$, from Gaspé Co., Quebec; FIG. 5, tips of leaves, $\times 10$, from the TYPE; FIG. 6, valve, $\times 10$, from the TYPE; FIG. 7, septum and seeds, $\times 10$, from the TYPE.



DRABA AUREA: FIG. 1, small flowering plant, $\times 1$, from Greenland; FIG. 2, small fruiting plant, $\times 1$, from Greenland; FIG. 3, fruiting plant, $\times 1$, from Alberta.



DRABA MINGANENSIS, n. sp.: FIGS. 1, 2 and 3, small flowering plants, $\times 1$, from Archipel de Mingan, Quebec (isotypes of *D. luteola*, var. *minganensis*); FIG. 4, flower, $\times 10$, from fig. 1; FIG. 5, small fruiting plant, $\times 1$, from Bic, Quebec.

D. LUTEOLA: FIG. 6, fruiting plant, $\times 1$, from Colorado; FIG. 7, silique, $\times 10$, from fig. 6.



DRABA MINGANENSIS: FIG. 1, well developed fruiting plant, $\times 1$, from Bic, Quebec; FIGS. 2 and 3, flowers and tip of silique, $\times 10$, from Bic.

bases his single record of the strictly Eurasian *D. fladnizensis* for all North America: "K a n a d a: Quebec, Matane Co., Mt. Mat-taouisse, Südseite des Fernald Passes, 915-1000 m ü. M. (M. L. Fernald, Ludlow Griscom, K. K. Mackenzie, A. S. Pease, L. B. Smith 1923, n. 25779, hb. Deless.)"—Schulz, p. 257. If the uniform and wholly isolated Gaspé plant is both *D. lactea* and *D. fladnizensis* (which it is not), it would seem that fuller demonstration is needed before *D. lactea* and *D. fladnizensis* are accepted as distinct species. The Malte collections from Hudson Strait have been identified by Mrs. Ekman as *D. lactea* and as *D. lactea* crossed with various other species (*D. nivalis*, *D. rupestris*, etc.). See comments on p. 250.

3. *D. Allenii*, sp. nov. (TAB. 292), planta valde humifusa stragula 0.3-2 dm. diametro formans; caudicorum ramis ramulisque filiformibus albescentibus confertis, inferne nervis mediis foliorum emortuorum persistentibus subulatis albidis nitidulis squamatis, superne foliis rosulatis cespitem laxum 0.5-2 dm. diametro formantibus; foliis tenuibus oblanceolatis 0.5-1.5 cm. longis 1-3 mm. latis subacutis integris vel subintegris enascentibus margine pilis simplicibus 0.2-0.5 mm. longis erectis deinde deciduis raro ciliatis caeterum gla-



Map 3. Range of DRABA ALLENI.

bris nerviis mediis subtus prominentibus; caulibus filiformibus simplicibus scapiformibus vel raro imo folio unico praeditis glabris nitidis 1-8 cm. altis; racemis floriferis confertis fructiferis parum elongatis (rhachi 0.2-2.5 cm. longo) 2-8-floris; pedicellis imis fructiferis 1.5-5.5 mm. longis; sepalis anguste oblongis 1.2-2 mm. longis 0.5-1 mm. latis submembranaceis glabris; petalis lacteis obovatis emarginatis 2-3 mm. longis 1-2 mm. latis; antheris 0.2 mm. longis; ovariis glabris 10-16-ovulatis; siliculis glabris oblongo-lanceolatis acutis vel acuminatis 2.7-7 mm. longis 1-2 mm. latis stylo 0.2-0.6 mm. longo coronatis, valvis reticulato-nervosis, septi medio valde plicato; seminibus a funiculis 0.2-0.5 mm. longis pendulis ovoideis brunneis 0.7-1.1 mm. longis.—Alpine areas of the Schickshock Mountains, Gaspé and Matane Cos., QUEBEC: on rock, at about 915 m. (3000 ft.), Table-topped Mountain, August 10, 1881, *J. A. Allen* (distributed as *D. androsacea*); abrupt, western calcareous slopes, alt. 1000-1100 m., Table-topped Mt., August 5, 1906, *Fernald & Collins*, no. 226 (distributed as *D. corymbosa*); calcareous cliffs, facing north, alt. 900-

1125 m., Table-topped Mt., August 7, 1906, *Fernald & Collins*, no. 581; mossy hornblende-schist at about 915 m. (3000 ft.) near eastern end of the basin, northeastern slope of "Mt. Logan" [later determined to be Mt. Mattaouisse], July 22, 1922, *Fernald & Pease*, nos. 25,097, 25,101, 25,102; cold chimneys and rock-shelves at about 915–1000 m. alt., south side of Fernald Pass, Mt. Mattaouisse, July 8, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,779 (TYPE in Gray Herb.); cold schistose walls at head (alt. about 1070 m.) of Big Chimney, Mt. Mattaouisse, July 14, 1923, *Fernald, Griscom, Pease & Smith*, no. 25,783; boggy openings in Fernald Pass, alt. about 885 m., between Mts. Mattaouisse and Fortin, August 20, 1923, *Fernald & Smith*, no. 27,780; moist turfy chimneys at about 850–1000 m. alt., southern slope of Mt. Fortin, July 12, 1923, *Fernald, Griscom & Mackenzie*, no. 25,781; gravelly and turfy slides and chimneys at about 850–1000 m. alt., in the steep schistose southern face of Mt. Fortin, August 21, 1923, *Fernald & Smith*, no. 25,784; cold, mossy chimneys (alt. about 800–1050 m.) at head of Pease Basin, between Mts. Logan and Pembroke, July 13, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,782. All distributed, unless otherwise noted, as *D. fladnizensis*. MAP 3.

Draba Allenii, like *Ranunculus Allenii* Robinson, commemorates the pioneer botanical explorations of the Shickshock Mts. by JOHN ALPHEUS ALLEN, 1863–1916. Although obviously related to *D. fladnizensis* Wulfen and *D. fladnizensis*, var. *heterotricha* (Lindbl.) Ball (*D. lactea* Adams; *D. Wahlenbergii* Hartm.), PLATE 291, it differs from them both in important characters. Schulz, as noted in the discussion of *D. fladnizensis*, var. *heterotricha*, cites the two specimens of *D. Allenii* which had come to his attention, one as the only basis in North America of *D. fladnizensis*, as var. *laxior* (Gaudin) O. E. Schulz, based on *D. sclerophylla* Gaud., β . *laxior* Gaudin; the other as the only eastern Canadian representative of *D. lactea*.

Whether *D. sclerophylla*, β . *laxior* Gaudin is properly referable to *D. fladnizensis* is a question for students of the alpine flora of Europe to determine; but from *D. Allenii* it is very definitely distinguished by the following points specially noted in Gaudin's original and very detailed description: "R o s u l a e sessiles, densissime caespitosae, aggregatae et quasi confluentes" (in *D. Allenii* the rosettes terminating loosely elongate caudices and themselves very lax); "F o l i a . . . dura, . . . lineari-ligulata, . . . obsolete uninervia, . . . pilis mere marginalibus, rigidis" (in *D. Allenii* leaves thin and membranaceous, oblanceolate, very prominently costate beneath, mostly eciliate, but rarely with a few flexuous cilia); "F l o r e s . . . per exsiccationem ochroleuci" (in *D. Allenii* with no

obvious yellow after 10–12 years); “*Siliculae . . . pedunculum aequantes, . . . ovales, . . . stigmatate sessili*” (in *D. Allenii* siliques much shorter than pedicels, lance-acuminate, with definite style). In general one does not expect in Gaspé local plants of the Swiss Alps, unless they have been found to have a broad circumpolar dispersal; and Schulz’s account of his *D. fladnizensis*, var. *laxior* contains a point not mentioned by Gaudin, which is inconsistent with *D. Allenii* being the European plant: “*Pedicelli . . . , inferiores (1–2) saepe ex axilla folii prodeuntes*” (never in *D. Allenii*).

Draba fladnizensis, as shown in the original plate and in other excellent illustrations as well as in specimens from the Tirol and from the Rhaetic Alps and other continental European mountains, is, as well described by Schulz, a densely cespitose plant, with closely crowded short crowns, the oblong leaves very conspicuously and permanently ciliate with long stiff divergent trichomes, the siliques ellipsoid or oblong, obtuse, with valves scarcely reticulate, the septum without a long fold, the seeds 12–20. *D. Allenii* in its humifuse habit, with elongate freely forking filiform caudices, its leaves, when rarely ciliate, with few short, soft and erect (not divergent) cilia, its lance-acuminate or acute siliques with distinctly veiny valves, strong longitudinal fold of the septum and fewer seeds, is abundantly distinct.

Whether or not *Draba lactea* (PLATE 291) is maintained as a species or is treated as a variety (var. *heterotricha*) of *D. fladnizensis*, it has little in common with *D. Allenii*: cespitose habit; coarsely ciliate and variously pubescent leaves; much larger flowers; oblong to narrowly ovate siliques averaging twice as large as in *D. Allenii* and with veinless valves, plane septum and more numerous and larger seeds.

Draba Allenii is presumably on Mt. Katahdin, Maine. On September 21, 1926, Dr. G. L. Stebbins, jr. found at 4000 feet in the Chimney of Mt. Katahdin two plants of a strange *Draba*. Dr. Stebbins’s published memorandum follows:

While looking at the plants of *Saxifraga aizoon* L. in the chimney, I noticed among them two plants of a *Draba* which I did not recognize, and which did not correspond to any of the *Drabas* described in Gray’s Manual. Although I searched the surrounding rocks, I failed to find more than two plants, so I dared to take only a stalk with the seed pods. When I showed this to Professor Fernald, he identified it as *Draba fladnizensis* Wulfen, an arctic-alpine species which had not been found before south of the Shickshock Mountains of Quebec, and is therefore new to New England. Although both the *Draba* and the *Saxifrage* are normally

lime-loving, they were growing here on granite rocks in an acid soil region, and seemed quite healthy. There may be a little rich pocket in that particular spot, and it would certainly be interesting to find the soil reaction there.¹

Under date of January 6, 1934, Dr. Stebbins writes: "I have visited the spot where I found them three times since, and in each case as diligent search as I was able to make failed to reveal the two plants or any others. I have, of course, been very much on the lookout for it on other parts of the mountain, but it hasn't turned up yet. The only hope for a real stand of it is in a narrow ravine that branches off the chimney to the right at its base, and looks wicked for climbing, though I have no doubt that the same band of softer, presumably more calcareous rock traverses it that is found in the chimney itself, which harbors quite a little *Saxifraga Aizoon*, and where I found the two plants mentioned."²

The much denuded fruiting raceme (with the valves gone) which Dr. Stebbins brought back seems to be that of *Draba Allenii*. Without seeing the foliage, however, it would be unwise to identify it with positiveness.

4. *D. RUPESTRIS* R. Br. Densely to loosely *cespitose*, the *multicipal caudex* with the short branches *retaining marcescent leaves or their shreds* and terminating in rosettes: *leaves* membranaceous, *linear-oblongate to oblong*, acutish, 5–15 mm. long, 1–3.3 mm. broad, 2–4-toothed or entire, *hispid with simple or variously forking trichomes*, the *midrib delicate and evanescent*: *flowering stem capillary, naked* (or rarely with 1–3 small leaves), 1–11 (—"25," *Ek.*) cm. high, *hirtellous* with simple and forking trichomes or rarely glabrous: raceme during anthesis corymbose, in fruit elongating and with rachis up to 6 cm. long, 3–20-flowered; *pedicels hirtellous* with simple or forking trichomes, in maturity 1–4 mm. long; *sepals* narrowly oblong, 1.5 mm. long, *hirtellous*: petals white, obovate, 2.5–4 mm. long: ovary glabrous or hirtellous with simple and forking trichomes, 12–30-ovuled; *siliques on suberect or strongly ascending short pedicels, oblong, 3–8 mm. long, hirtellous* with simple or forking trichomes or glabrous (var. *LEIOCARPA* O. E. Schulz), with very short style: seeds oval,

¹ G. L. Stebbins, jr., RHODORA, xxix. 15, 16 (1927).

² Dr. E. T. Wherry, reporting on soil from the base of the *Saxifraga Aizoon* from Mt. Katahdin, "found it to be exactly neutral. The lime producing this condition in the soil may have come from a local concentration of calcium minerals in the granite—which is well known to occur elsewhere in Maine, especially on Mt. Desert Island—or may have been set free by unusually thorough decomposition of the humus at this point. The thing most difficult to account for would seem to be the manner in which the seeds of these circumneutral soil species managed to 'find' this favorable spot in the middle of a vast area of soils too acid to permit the plants to thrive.—Wherry, RHODORA, xxix. 139, 140 (1927).

brown, 1–1.3 mm. long.—R. Br. in Hort. Kew. ed. 2. iv. 91 (1812); DC. Syst. ii. 344 (1821) and Prodr. i. 169 (1824); Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, lvii. no. 3: 53, t. 3, figs. *h* and *o* (1917); O. E. Schulz in Engler, Pflanzenr. iv¹⁰⁵. 223 (1927). *D. hirta* Sm. Fl. Brit. ii. 677 (1800) and Engl. Bot. xix. t. 1338 (1804), not L. (1759). *D. hirta*, γ *rupestris* (R. Br.) Wahlenb. Fl. Suec. 399 (1824).—Northern Europe, Greenland, Labrador, Ungava and Newfoundland, very local. LABRADOR: Ramah, July 15–August 20, 1894, *A. Stecker* (distributed as *D. hirta*, var. *arctica*); Eastward side of East Summit of Bishop's Mitre, lat. 57° 56', August 21, 1931, *Abbe*, no. 385; Okkak, *Weitz* (Brit. Mus.); Battle Harbor, August 3, 1913, *W. E. Ekblaw*. UNGAVA: crevices of rock, Cape Chudleigh, *R. Bell*, no. 2027. NEWFOUNDLAND: limestone barren, near sea-level, Pointe Riche, August 4, 1910, *Fernald, Wiegand & Kittredge*, no. 3455, siliques glabrous = var. *LEIOCARPA* O. E. Schulz, l. c. 224 (1927). PLATE 293; MAP 4.



Map 4. Eastern American Range of *DRABA RUPESTRIS*.

Draba rupestris is obviously very rare in eastern America. The plants cited are fair matches for material from the type station, Ben Lawers (FIG. 1). Most of the plants, common in western and northern Newfoundland, with a marked variety in Gaspé, which have been passing as *D. rupestris* are better referred to the coarser and usually more leafy *D. norvegica* Gunner. Should it prove on further observation, as seems not unlikely, that *D. rupestris* and *D. norvegica* are confluent, the earliest name, *D. norvegica* Gunner (1772), should be used for both. I am here maintaining *D. rupestris* out of deference to the opinion of European students, although I expect that further study in the field will demonstrate it to be only an extreme phase of *D. norvegica*.

5. *D. CRASSIFOLIA* Graham. *Short-lived perennial* (biennial or annual?) with simple or slightly branching caudex forming solitary rosettes or mats up to 5 cm. broad, *glabrous throughout* or the leaves sometimes ciliate: *leaves somewhat fleshy, drying thin and subtranslucent, oblanceolate, obtuse or subacute, entire or essentially so, 0.4–1.5 cm. long, 1.5–5 mm. broad, glabrous throughout or frequently sparsely ciliate with simple (rarely bifurcate) trichomes 0.5–1 mm. long: scapes filiform, including the raceme 1–10 cm. high, naked or rarely with 1 or 2 leaves, glabrous: raceme at first corymbiform, elongating in fruit to 1–7 cm., 3 (rarely 1)–10-flowered, the lower 1–2 flowers remote: pedicels filiform, glabrous, the lower in fruit becoming 4–10*

(rarely -22) mm. long: sepals oblong or oblong-elliptic, 1.5-2.3 mm. long: petals yellow, drying whitish, rarely white from the first, often



Map 5. Southeastern Extension in America of *DRABA CRASSIFOLIA*.

purple-tinged, narrowly spatulate-obovate to cuneate-oblongate, emarginate, 2-3 mm. long, 0.7-1.2 mm. wide: anthers 0.2-0.3 mm. long: ovary glabrous, with 16-20 ovules and sessile stigma: siliques on spreading or arched-ascending pedicels, elliptic-lanceolate to oblong, glabrous, 3-9.5 mm. long, capped by the sessile stigma; the valves scarcely nerved: seeds 0.75-0.8 mm. long.—Edinb. New Phil. Journ. (Apr.-June, 1829), 182 (1829); Hook. Fl. Bor.-Am. i. 54 (1830); Torr. & Gray, Fl. N. Am. i. 106 (1838); Lange, Consp. Fl. Groenl. 38 (1880); Wats. in Gray, Synop. Fl. N. Am. i¹. 108 (1895), mostly; Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, ii. no. 7: 32 (1926); O. E. Schulz in Engler, Pflanzenr. iv¹⁰⁵. 325 (1927).—Greenland; Labrador; northernmost Ungava; Rocky Mountains of Alberta and British Columbia, south in alpine areas, very locally, to Colorado; Arctic Europe. LABRADOR: steep, wet cold bank of "K" River, Kangalaksiorvik, lat. 59° 18', Abbe, no. 374; Ramah, Sornborger, no. 175 (mostly). UNGAVA: Port Burwell, Hudson Strait, Malte, no. 120,092. PLATE 294; MAP 5.

In western America passing into the following varieties:

Var. ALBERTINA (Greene) O. E. Schulz, l. c. 327 (1927). *D. albertina* Greene, Pittonia, iv. 312 (1901).—Leaves more or less pubescent with stellate as well as simple and bifurcate trichomes; the cilia often numerous and 0.7-1.3 mm. long; racemes up to 17-flowered.—Alberta and British Columbia to Colorado and California.

Var. PARRYI (Rydb.) O. E. Schulz, l. c. 327 (1927), as to type, but excluding Schulz's description and the Labrador plant. *D. Parryi* Rydb. Bull. Torr. Bot. Cl. xxix. 241 (1902).—Leaves linear-oblongate, 1-2.5 cm. long, 1-2.5 mm. wide, acutish, glabrous or ciliate only at base: flowering stems up to 1.6 dm. high, with racemes up to 25-flowered.—Colorado and Wyoming. PLATE 300, FIGS. 4 and 5.

Although *Draba crassifolia* is often said to be sometimes annual ("annual or biennial"—Watson; "Herba annua, dein perennans"—Schulz), I have seen few specimens which seem to be unquestionably annual; most of them have remnants of the last year's leaves below the fresh rosette. Those who have known the species best all treat it as perennial. Graham had before him the living plants which he had himself raised at Edinburgh from seeds "presented by Mr. Drummond in February 1828." These began flowering and fruiting

in 1829, and under date of "10th June 1829" Graham described his species: "Plant densely caespitose, perennial." That it is a perennial which begins flowering very promptly is, however, indicated by Graham's statement: "It flowers most freely, . . . produces abundance of seed, and has come up in many of the neighbouring pots in the Edinburgh Botanic Garden without any change of character." If by the latter statement Graham meant that the cultivated plant had, in slightly more than one year, seeded, scattered its seeds and produced a second crop which had matured far enough to justify his saying "without any change of character," then, in cultivation in a temperate climate, *D. crassifolia* may evidently become annual. Mrs. Ekman, who seems to have studied the Greenland and European plants very thoroughly, says, "*Planta saepe caespitosa.*" On the other hand, specimens of Drummond's original material (FIG. 1), which had once belonged to Jacques Gay but which are now in the Gray Herbarium, bear Gay's comment: "Févr. 1851. La plante est évidemment annuelle! Hooker et Asa Gray la classent à tort parmi les espèces vivaces."

Rydberg, in his *Flora of the Rocky Mountains*, ed. 2: 350, 353, reduces *D. albertina* Greene, without qualification, to *D. crassifolia* and he defines the latter as having "leaves oblanceolate to spatulate, hirsute" as contrasted with the "leaves narrowly linear-oblanceolate, glabrous" of his own *D. Parryi* (PLATE 300, FIGS. 4 and 5), which he maintains as a species.

In view of the doubts raised as to the duration of *Draba crassifolia* and by the definition of it by Rydberg as having the leaves hirsute, it has seemed desirable to examine Graham's own specimen. This, most happily, has been possible through the kindness of my good friend, the Regius Keeper of the Royal Botanic Garden at Edinburgh, Sir William Wright Smith (to whom I here reexpress my sincere appreciation); and I now have before me the original specimen preserved by Graham: "*Draba crassifolia* Graham, Hort. Bot. Edin. 1829. Seeds from Arctic America."¹ This is, as Graham himself stated, identical with Drummond's material (PLATE 294, FIG. 1).

¹ Drummond collected the plant, as shown on the label of one of his specimens in the Gray Herbarium (sent by Hooker, with whose specimens Graham's cultivated plant is identical) on "Summits of the Rocky Mountains between lat. 52° and 57°." The assumption, very general in the reports on botanical explorations in British America in the 1st half of the 19th century, that all points slightly north of the international boundary were "arctic" has led to endless confusion, by the citation, by Hooker and others, of plants growing from 52°–57° as coming from "Arctic America."

It is the northernmost extreme of the species adequately and clearly described by Graham with "*Leaves* (5 lines long, 2 broad), much crowded, subcarnose, smooth, veinless [when fresh, although clearly veiny by transmitted light when dry], indistinctly keeled, subdenticulate, rather sparingly ciliated with simple spreading hairs."

Rydberg's description of his *Draba Parryi* (which I am treating as a Colorado variety of *D. crassifolia*) was

Annual, perfectly glabrous, except a few cilia on the petioles: stems several, usually less than 1 dm. high, scapiform or rarely with a stem leaf: basal leaves numerous, linear or narrowly linear-oblongate, 1.5–2.5 cm. long—; etc.

The Colorado material of var. *Parryi* (PLATE 300, FIGS. 4 and 5) has at most (so far as I have seen) about 24 seeds in a silique, the leaves are at most 2.5 mm. wide and the tallest stem seen is 1.6 dm. high. Schulz, however, in transferring *D. Parryi* to varietal rank, gives it a characterization so unlike that of Rydberg's species that it is apparent that he has confused something with it:

Planta altior et ramosior, fructifera usque ad 20 cm longa. Caules interdum 3–4-phylli. Folia longiora, usque 3 cm longa. . . . Ovarium 24–36-ovulum. Pedicelli inferiores saepe valde elongati, usque 2, 5 cm longi.

Schulz, furthermore, begins his citation of specimens with Labrador; and of the tall (up to 2.5 dm.), branching, large-leaved (leaves 3–8 mm. broad), leafy-stemmed plant from Ramah (*Sornborger*, no. 61), which may have as many as 48 ovules and which has petals twice as large as in *D. Parryi*, he specially comments: "August fruchtend, besonders luxuriös mit beblätterten Ästen." Schulz's description of var. *Parryi* was, apparently, derived chiefly from the wholly distinct plant of Labrador (our no. 11, PLATE 300, FIGS. 1–3).

I have not seen the other Labrador specimens cited by Schulz under var. *Parryi*; they may be like the Sornborger material. It should be noted, however, that "Cumberland Inlet," cited under Labrador, is presumably the well-known Cumberland Sound of Baffin Island.

6. *D. NIVALIS* Liljebl. Densely to loosely *cespitose*, forming mats 1–10 cm. across; the branches of the multicapital *caudex* clothed with *marcescent shreds* of dead leaves and ending in compact *subglobose rosettes* 3–15 mm. in diameter: *leaves cuneate-obovate to broadly oblanceolate, obtuse, entire or essentially so, subcoriaceous, 3–11 mm. long, 1–4.5 mm. broad, with the firm subulate midrib prominent beneath, the surfaces canescent-pannose with minute sessile or sessile stellate*